New Jersey Department of Health and Senior Services

# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **COBALT**

CAS Number: 7440-48-4
DOT Number: UN 3089
DOT Hazard Class: 4.1 (Flammable solid)

RTK Substance number: 0520
Date: May 1998 Revision: June 2005

## HAZARD SUMMARY

* **Cobalt** can affect you when breathed in.
* **Cobalt** should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
* **Cobalt** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
* Exposure to **Cobalt** dust can irritate the skin, eyes, nose and throat.
* **Cobalt** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
* **Cobalt** may affect the heart, thyroid, liver and kidneys.
* Repeated exposure to **Cobalt** dust can cause scarring of the lungs (fibrosis) even if no symptoms are noticed. This can be disabling or fatal.
* *Finely divided* **Cobalt** is FLAMMABLE and may ignite spontaneously.

## IDENTIFICATION

**Cobalt** is a silver-gray, bendable metal. It is used in steel alloys and jet engines, in nuclear technology, and in cemented carbide abrasives and tools. **Cobalt** has several artificial radioactive isotopes, the most important being **Cobalt 60**. **Cobalt 60** is a beta and gamma emitter and is used in radiation therapy, level gauges, and in research.

## REASON FOR CITATION

* **Cobalt** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, IARC and EPA.
* This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN** and is **FLAMMABLE.**
* **Cobalt** is a radioactive isotope and is regulated by the Nuclear Regulatory Commission (NRC). Refer to the NRC Standard: 10 CFR 20.
* Definitions are provided on page 5.

## HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

## WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.1 mg/m$^3$** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.05 mg/m$^3$** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **0.02 mg/m$^3$** averaged over an 8-hour workshift.

* **Cobalt** may be a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
* Exposure to radioactive materials is regulated by NRC and OSHA. Refer to the NRC Standard: 10 CFR 20 and the OSHA Standard: 29 CFR 1910.1096.

## WAYS OF REDUCING EXPOSURE

* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Cobalt** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Cobalt** to potentially exposed workers.

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This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Cobalt**:

* Exposure to **Cobalt** dust can irritate the skin, eyes, nose and throat.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Cobalt** and can last for months or years:

### Cancer Hazard

* **Cobalt** may be a CARCINOGEN in humans since it has been shown to cause cancer of the muscle (only at the injection site) in animals.
* Many scientists believe there is no safe level of exposure to a carcinogen.

### Reproductive Hazard

* **Cobalt** may damage the male reproductive system (including a decrease in sperm count) and affect male fertility in animals.

### Other Long-Term Effects

* **Cobalt** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
* **Cobalt** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
* **Cobalt** may affect the heart, thyroid, liver and kidneys.
* Repeated exposure to **Cobalt** dust can cause scarring of the lungs (fibrosis) even if no symptoms are noticed. This can be disabling or fatal.

## MEDICAL

### Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

* Chest x-ray for scarring should be done every two to three years after five or more years of exposure.
* Lung function tests.

If symptoms develop or overexposure is suspected, the following are recommended:

* EKG.
* Liver and kidney function tests.
* Thyroid function tests.
* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.
* Lung function tests. These may be normal if the person is not having an attack at the time of the test.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

### Mixed Exposures

* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
* Because more than light alcohol consumption can cause liver damage, drinking alcohol may increase the liver damage caused by **Cobalt**.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically transfer **Cobalt** from drums or other storage containers to process containers.
* Before entering a confined space where *finely divided* **Cobalt** *powder or dust* may be present, check to make sure that an explosive concentration does not exist.
* Specific engineering controls and personnel monitoring are required by the NRC Standard: 10 CFR 20, and OSHA Ionizing Radiation Standard: 29 CFR 1910.1096. Also check specific state regulations.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Cobalt** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Cobalt**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Cobalt**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Cobalt**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Cobalt** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
* Use a vacuum to reduce dust during clean-up. DO NOT DRY SWEEP.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

* Avoid skin contact with **Cobalt**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

* Wear eye protection with side shields or goggles.
* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
* Contact lenses should not be worn when working with this substance.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Cobalt**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **20 mg/m$^3$** is immediately dangerous to life and health. If the possibility of exposure above **20 mg/m$^3$** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

## HANDLING AND STORAGE

* Prior to working with **Cobalt** you should be trained on its proper handling and storage.
* *Finely divided* **Cobalt** must be stored to avoid contact with AMMONIUM NITRATE since violent reactions occur.
* **Cobalt** is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES,

CHLORINE, BROMINE and FLUORINE); AIR; ACETYLENE; and OXYGEN.

* Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLE MATERIALS (such as WOOD, FUEL and OILS).
* Sources of ignition, such as smoking and open flames, are prohibited where *finely divided* **Cobalt** is used, handled, or stored.
* Metal containers involving the transfer of *finely divided* **Cobalt** should be grounded and bonded.
* Use only non-sparking tools and equipment, especially when opening and closing containers of *finely divided* **Cobalt**.
* Wherever *finely divided* **Cobalt** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

## QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

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The New Jersey Department of Health and Senior Services, Occupational Health Service, offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-2202.

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## DEFINITIONS

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

**CFR** is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m$^3$** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

## >>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **COBALT**
DOT Number: **UN 3089**
DOT Hazard Class: **4.1 (Flammable solid)**
NAERG Code: **170**
CAS Number: **7440-48-4**

| Hazard rating | NJDHSS | NFPA |
|---|---|---|
| **FLAMMABILITY** | 3 | - |
| **REACTIVITY** | 0 | - |
| CARCINOGEN<br>FINELY DIVIDED COBALT IS FLAMMABLE<br>MAY BE RADIOACTIVE | | |

*Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe*

## FIRE HAZARDS

* **Cobalt** is not combustible when in solid or bulk form. However, *finely divided* **Cobalt** is FLAMMABLE and will ignite spontaneously in air.
* Use dolomite, sand, soda ash, dry powder or graphite powder for extinguishing a powdered metal fire. DO NOT USE WATER directly on material.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

## SPILLS AND EMERGENCIES

If **Cobalt** is spilled, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.
* If spill involves *radioactive* **Cobalt**, evacuate area and delay clean-up until properly instructed by qualified radiation authorities.
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
* Ventilate and wash area after clean-up is complete.
* It may be necessary to contain and dispose of **Cobalt** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

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FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: 1-877-WARN-DEP

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## HANDLING AND STORAGE (See page 3)

## FIRST AID

*For POISON INFORMATION call 1-800-222-1222*

### Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

### Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

### Breathing

* Remove the person from exposure.
* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

## PHYSICAL DATA

**Vapor Pressure:** 0 mm Hg at 68$^{o}$F (20$^{o}$C)
**Water Solubility:** Insoluble

## OTHER COMMONLY USED NAMES

### Chemical Name:

Cobalt

### Other Names:

Cobalt-59; C.I. 77320

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NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES
**Right to Know Program**
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

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